

### REMARKS

Applicants respectfully request further consideration of this application, and further consideration of the Office Action dated May 2, 2006. Upon entry of this Amendment, claims 4-7, 13, 16, 17, 20, 25, 26, 29, 30 and 34-37 will remain pending in this application. Claim 16 is amended to recite a thickness range of the mask layer which is not taught by any of the references of record. Claims 6 and 36 are amended only to correct typographical errors.

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Claims 4-7, 16-17, 20, 25, 26, 29-30, and 59 stand rejected under 35 U.S.C. § 103(a) as purportedly obvious based on Zheleva et al (Dislocation density reduction...) in view of Shakuda (US Patent 5,838,029), and further in view of Mauk (US Patent 5,828,088). Claim 13 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Zheleva et al. ("Dislocation density reduction via lateral epitaxy in selectively grown GaN structures") in view of Shakuda (US 5,838,029) and Mauk (US 5,828,088) as applied to claims 4-7, 16-17, 20, 25 26, 29-30 and 59 above, and further in view of Tadatomo et al. (US 5,770,887). Claims 34 and 36 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Zheleva et al. ("Dislocation density reduction via lateral epitaxy in selectively grown GaN structures") in view of Shakuda (US 5,838,029) and Mauk (US 5,828,088), as applied to claims 4-7, 16-17, 20, 25, 26, 29-30 and 59 above, and further in view of IBM (Abstract of "Method of Producing Gallium Nitride Boules for Processing into Substrates"). Claims 35 and 27 stand rejected under 35 U.S.C. §103(a) as unpatentable over Zheleva et al. ("Dislocation density reduction via lateral epitaxy in selectively grown GaN structures") in view of Shakuda (US 5,838,029) and Mauk (US 5,828,088), and further in view of IBM ("Method of Producing Gallium Nitride Boules for Processing into Substrates") as applied to claims 34 and 36 above, and further in view of Inoue (US 5,182,233).

These grounds of rejection are respectfully traversed.

Claim 16 is amended to recite a thickness range of the mask layer which is not taught by any of the references of record. As to the other claims, the various claimed combinations are

note made by combining the teachings of Zheleva et al, Shakuda et al and Mauk in any combination.

Shakuda et al. state that GaAs was chosen to be the substrate material because the lattice constant of GaAs is closer to that of GaN than other materials (col. 10, line 22~). However, the lattice constant of GaN (0001) is 3.189 Å. On the other hand, the lattice constant of SiC (0001) is 3.0730Å. Thus, the difference between the GaN (0001) and GaAs (111) is 0.8085Å, which is seven times more than that of GaN (0001) and SiC (000), which is 0.116Å. Our inventors conclude therefore that it is unlikely that Shakuda et al. decided to use GaAs substrate instead of SiC to reduce crystal defect and distortion.

Japanese Patent Application Laid Open No. HEI8-116090 mentioned on page 2, line 7 in our specification is the original application in the family of the Shakuda U.S. reference cited by the Examiner. The cited method will only obtain substrates with crystal defects and distortion, as described in our specification at page 3, line 7.

The tests with mask (the present invention) and without mask (Shakuda's method) are described in example 4 (page 60, line 5 to page 62, line 22) of our specification. The curvature radius of the GaN crystal is 65mm without the mask, and 770mm with the mask. The mask prevents distortion of the substrate and makes the radius of curvature longer. The result indicates that our claimed methods (using a mask) are better than Shakuda's method (not using a mask).

Mauk et al. uses liquid phase growth and is thus quite different from the approach taken in our application which utilizes vapor phase epitaxy. GaN will not grow substantially without liquid phase unless developed under 10,000 nitrogen pressure because nitrogen has a low solubility in the Ga solution. Mauk et al. mentions about the liquid phase growth of GaAs and AlGaAs but does not mention about the growth of GaN.

The size of the mask also depends on the device size, as described by Mauk (col. 5, line 54~). The Mauk et al masks. act as a reflector (col. 6, line 46~). In contrast the purpose of our

masks is to reduce the number of dislocations. Also, the size of the window provides enough space to secure the wettability with material solution (col. 5, line 50~).

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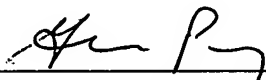
Applicants respectfully submit that this Amendment and the above remarks obviate the outstanding issues in this case, thereby placing the application in condition for immediate allowance. Allowance of this application is earnestly solicited.

If any fees under 37 C.F.R. §§ 1.16 or 1.17 are due in connection with this filing, please charge the fees to Deposit Account No. 02-4300; Order No. 033035.0341.

If an extension of time under 37 C.F.R. §1.136 is necessary that is not accounted for herewith, such an extension is requested. The extension fee should be charged to Deposit Account No. 02-4300; Order No. 033035.0341.

Respectfully submitted,  
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